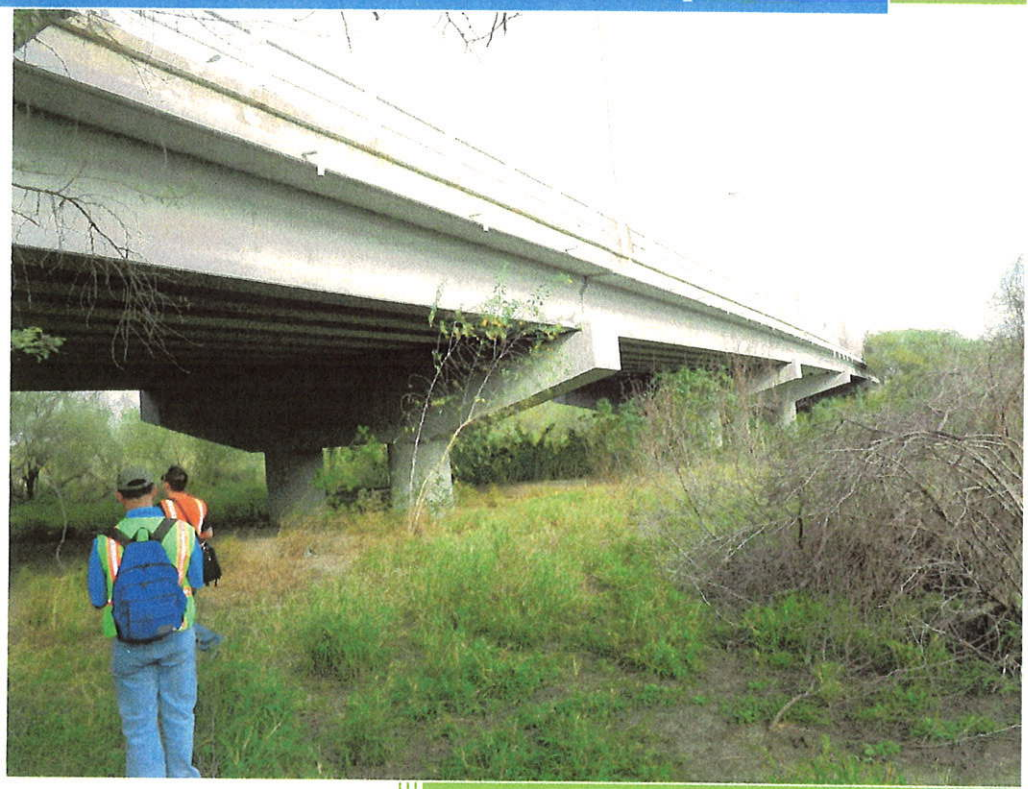
2013

Free Trade International Bridge Annual Inspection Report



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CONSULTING ENGINEERS

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FREE TRADE INTERNATIONAL BRIDGE
AT LOS INDIOS
ANNUAL INSPECTION REPORT

SUBMITTED TO:

CAMERON COUNTY

BROWNSVILLE, TEXAS

SUBMITTED BY:

STRUCTURAL ENGINEERING ASSOCIATES, INC.

SAN ANTONIO, TEXAS

FEBRUARY 25, 2013

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1 Introduction

Structural Engineering Associates, Inc. (SEA) has been retained by Cameron County to provide a structural inspection of the Free Trade International Bridge located in Los Indios, Texas. The bridge carries two-way traffic into and out of Mexico. The purpose of this report is to give an overall summary of the structural condition of the bridge as it currently exists. The inspection was conducted on January 23, 2013 by Johnny Martinez, P.E., Ernest Meche, P.E. and Adrian Romero, P.E. The inspection included both the U.S. and Mexican sides of the bridge. The assessment given in the following pages is our opinion and is limited to what could be visually observed. Material and laboratory testing was not included. Also not included were site surveys, structural analysis, recommendations for repairs, and associated cost estimates. Note that bridge components located over the Rio Grande River, which were not accessible, were observed through binoculars only.

The process used to compile this report included the following activities:

1. Review of previous engineering reports and plans for the bridge.
2. On-site field investigation of the bridge.
3. Preparation and submittal of an inspection report.

The structural inspection includes all structural components of the bridge from abutment to abutment. The toll collecting facilities were not inspected and are not part of this report. This report often refers to span and bent numbers. See section 5, at the end of this report, for span and bent locations.

2 Bridge Description

Overall view of bridge (Mexico)

The Free Trade International Bridge is used for Mexico and U.S. bound pedestrian and vehicular traffic. The overall length of the bridge is approximately 533'. The U.S. portion of this bridge extends from Abutment No. 6 to the international boundary between Bents No. 3 and No. 4. This distance is approximately 254'. The bridge has five spans, an asphalt overlay and two lanes of traffic in each direction. There is an approximately 5' wide sidewalk on the west and east sides of the bridge. The east and west sides of the bridge have a metal traffic rail, while the U.S. side only has additional fencing on the outside of the rail.

On the day of our visit, there was no pedestrian traffic and minimal vehicular traffic.

3 Structural Inspection

3.1 Roadway

3.1.1 Bridge Deck

Figure 3.1.1–A (Mexico)

There are minimal visible cracks and pitting in the deck surface. It is slightly worn but overall the deck surface appears to be in good condition. The asphalt overlay appears to be structurally adequate. The lane stripes are visible on the U.S. side, but barely noticeable on the Mexican side of the bridge. Figure 3.1.1–A shows an overall view of the deck on the Mexican side with faded striping while Figure 3.1.1–B shows typical minor cracking found in the deck. Figure 3.1.1-C shows traffic buttons missing from the international border designation.

Figure 3.1.1-B (Mexico)

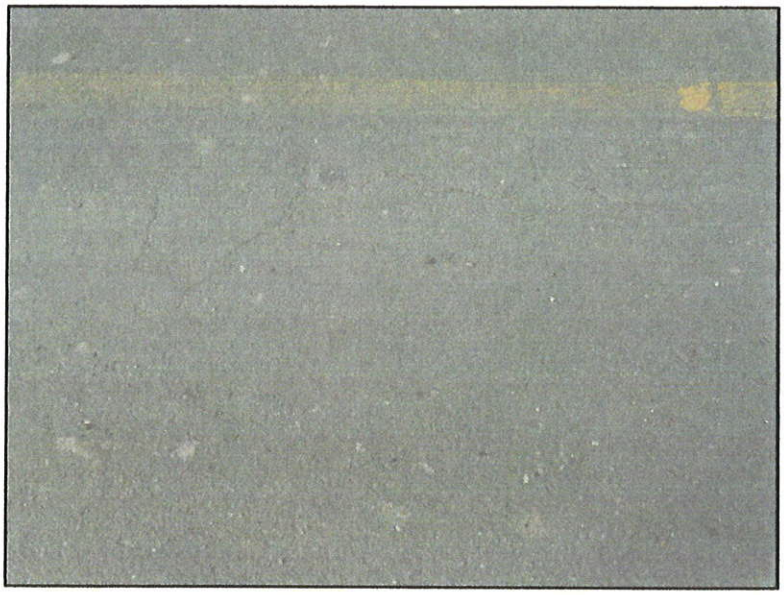
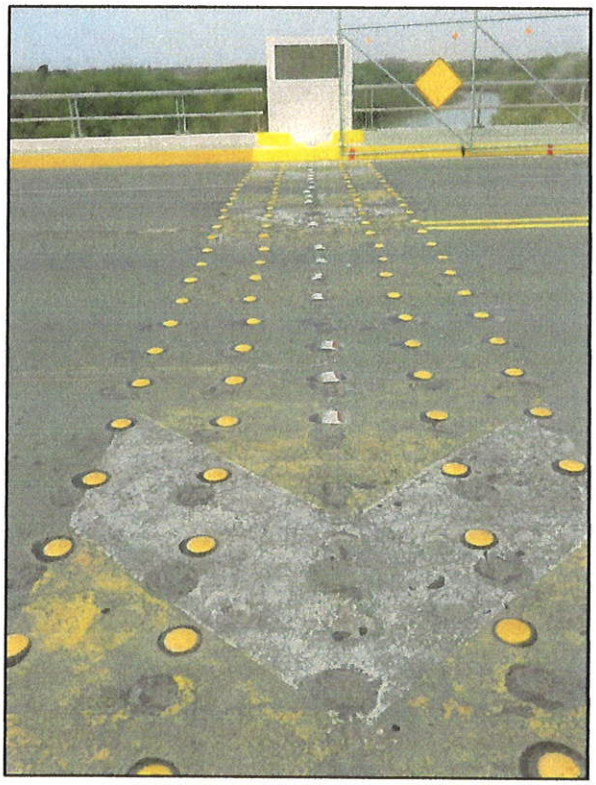


Figure 3.1.1-C (Border)



3.1.2 Bridge Joints

The majority of the bridge joints are in satisfactory condition with a few notable exceptions on the Mexican side of the bridge. Figure 3.1.2-A shows abutment 1 with a crack in the approach slab running parallel to the joint.

Figure 3.1.2-A (U.S.)

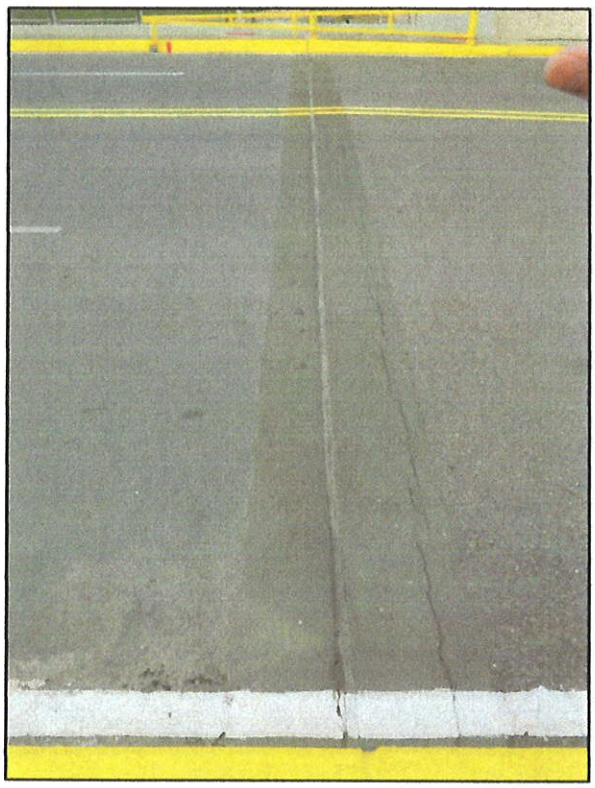


Figure 3.1.2-B shows the bent 3 expansion joint. Note the depressed rubber seal and gap in the joint as well as cracked concrete at the joint.

Figure 3.1.2–B (Mexico)

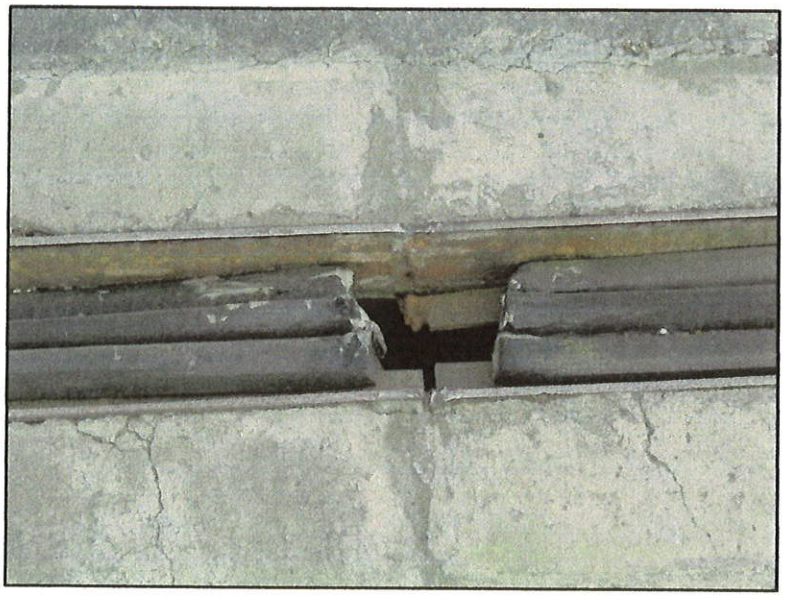


Figure 3.1.2–C (Mexico)

Figure 3.1.2-C shows extensive damage to the expansion joint at abutment 1. The damage is located on the northbound lanes near the sidewalk and is severe enough that one lane is closed to traffic. The damage includes a bent steel plate, bent and broken studs, damaged seal and missing grout around the joint. This joint requires immediate repairs or replacement before traffic can resume on the northbound lane.

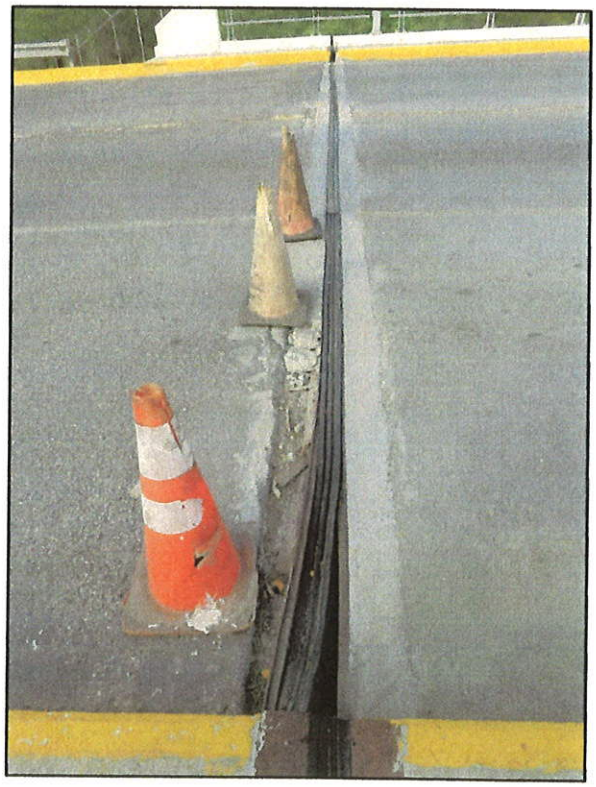
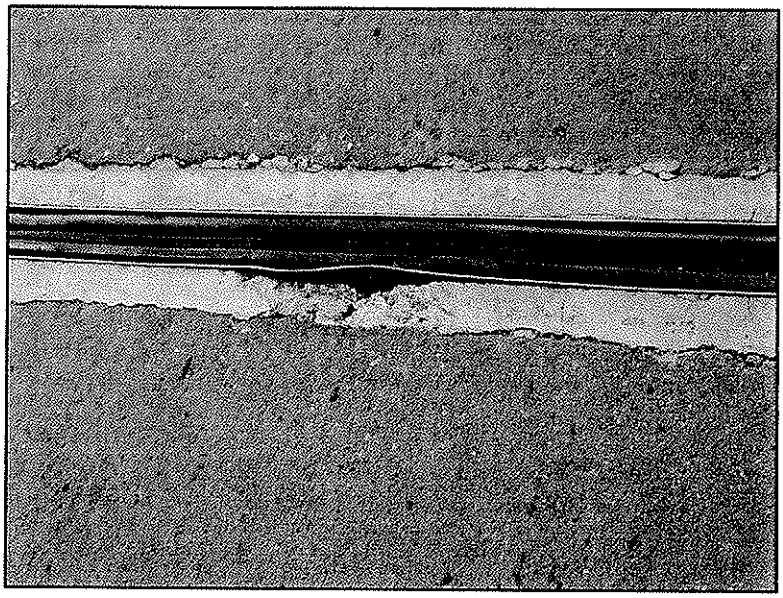


Figure 3.1.2-D shows damage to the expansion joint at bent 2 southbound lane, near the sidewalk. Note the bent plate and spalled grout at this location.

Figure 3.1.2–D (Mexico)



3.1.3 Bridge Drains

The bridge drains are located alongside the curb on both sides of the bridge. The drains on the Mexican side of the bridge have a smaller diameter than the U.S. drains. Most of the Mexican drains were partially or totally blocked. Figure 3.1.3–A shows an example of a drain, on the Mexican side, that is 100% clogged. All clogged bridge drains should be either cleared out as a short term solution or perhaps larger drain pipes are required as a long term solution. Overall the bridge drains appear to be in fair to satisfactory condition.

Figure 3.1.3-A (Mexico)

3.1.4 Curbs and Sidewalks

A concrete sidewalk runs along the east and west edge of the bridge roadway. The sidewalk has minor cracking, pitting and spalling. In addition, the sidewalk expansion joint cover plate is not flush with the sidewalk at some locations and missing at other locations. See Figure 3.1.4–C for one location that has a bent expansion joint plate at the sidewalk. Also at one of the light poles, a pullbox cover is missing and the box is partially filled with dirt. Another pullbox cover is missing hold down bolts. Overall the curb and sidewalk appear to be structurally adequate and in good condition; however, may require minor maintenance in the near future.

Figure 3.1.4–A shows as example of a sidewalk expansion plate that is not flush with the concrete sidewalk. This plate is located at bent 4 on the east side of the bridge.

Figure 3.1.4-A (U.S.)

Figure 3.1.4-B shows a typical example of minor cracking. These cracks are located along span 3 at the east side of the bridge.

Figure 3.1.4-B (Mexico)

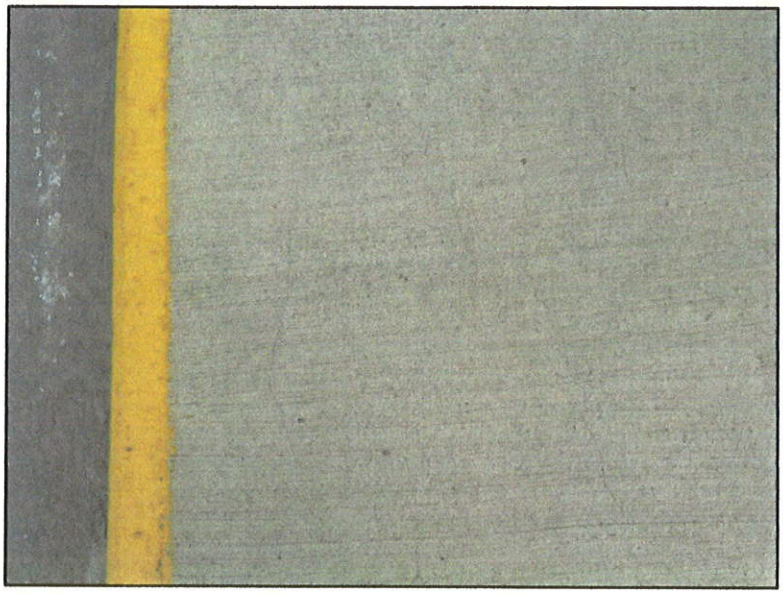


Figure 3.1.4–C shows a rusty sidewalk expansion joint plate that is also bent at one corner. This plate is located at bent 2 on the east side of the bridge.

Figure 3.1.4–C (Mexico)

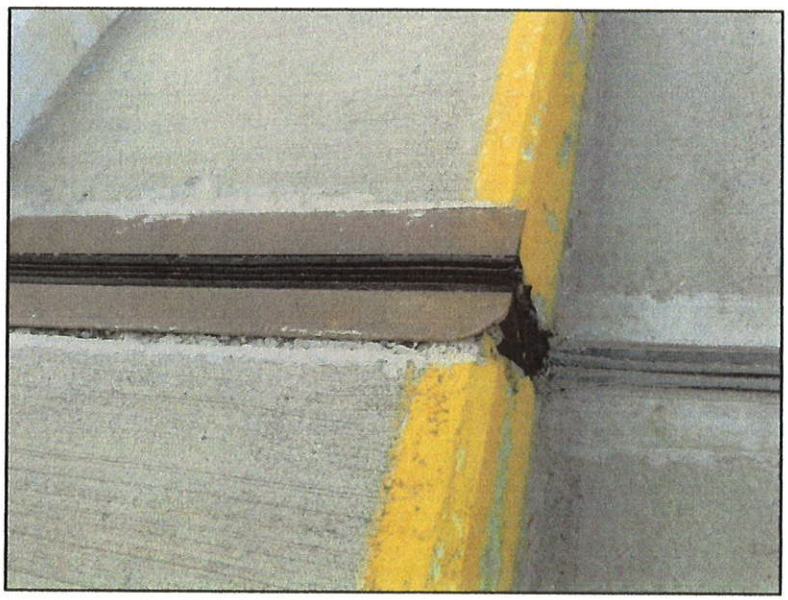


Figure 3.1.4–D shows an example of cracking and spalling in the sidewalk. This damage is located at the span 1 southbound sidewalk.

Figure 3.1.4-D (Mexico)

Figure 3.1.4–E shows a pullbox with a missing cover partially filled with dirt. This pullbox is located on the southbound sidewalk on span 3 near bent 3.

Figure 3.1.4-E (Mexico)

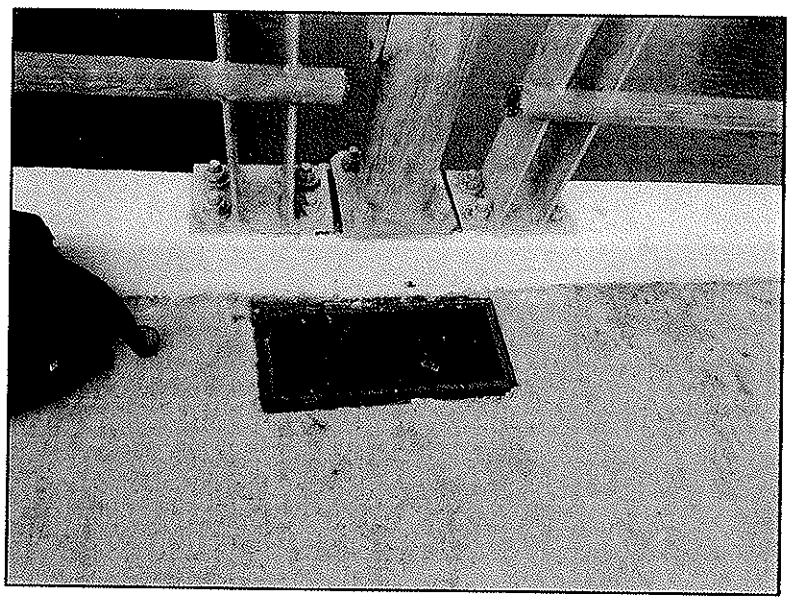
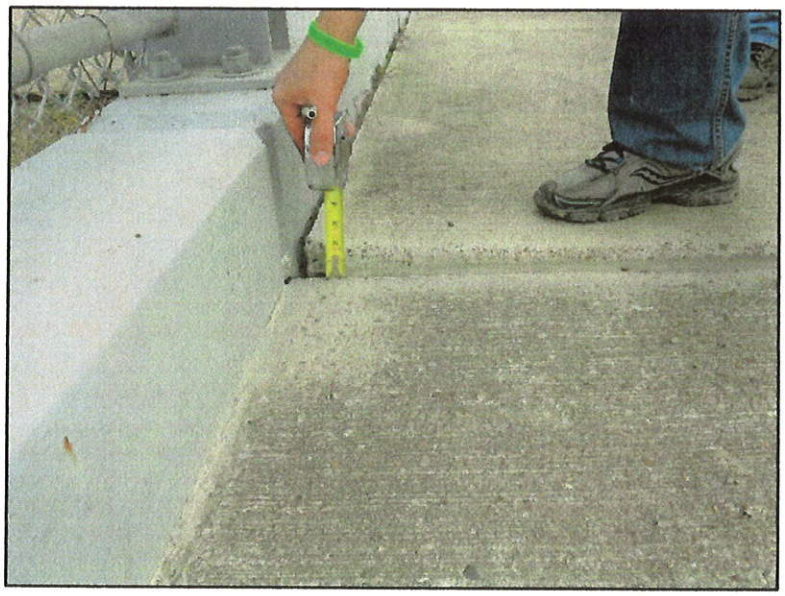


Figure 3.1.4–F is located at abutment 6. It shows differential movement at the sidewalk. Note that the sidewalk on the approach slab is approximately 1 ½" higher than the abutment 6 sidewalk.

Figure 3.1.4–F (U.S.)



3.1.5 Traffic Rails

A metal traffic rail runs along both edges of the roadway. The rail has numerous isolated locations of rust. At one location there is a gap in the rail. Light poles are placed on the same curb that the rail is located. Overall the traffic rail appears to be structurally adequate and in satisfactory to good condition.

Figure 3.1.5–A shows the northbound rail at bent 3. Note that the rail is missing an expansion piece at the expansion joint and the steel plates, bolts and nuts are rusty.

Figure 3.1.5–A (Mexico)

Figure 3.1.5–B shows a light pole concrete pedestal cracked at span 2 on the southbound sidewalk. Also note the rusty rail, bolts, nuts, and pull box cover plate.

Figure 3.1.5-B (Mexico)

3.1.6 Fence

The high fence as seen in Figure 3.1.6–A is only located on the U.S. side of the bridge and appears to be in good condition. The fence is mounted to the bridge behind the traffic rail.

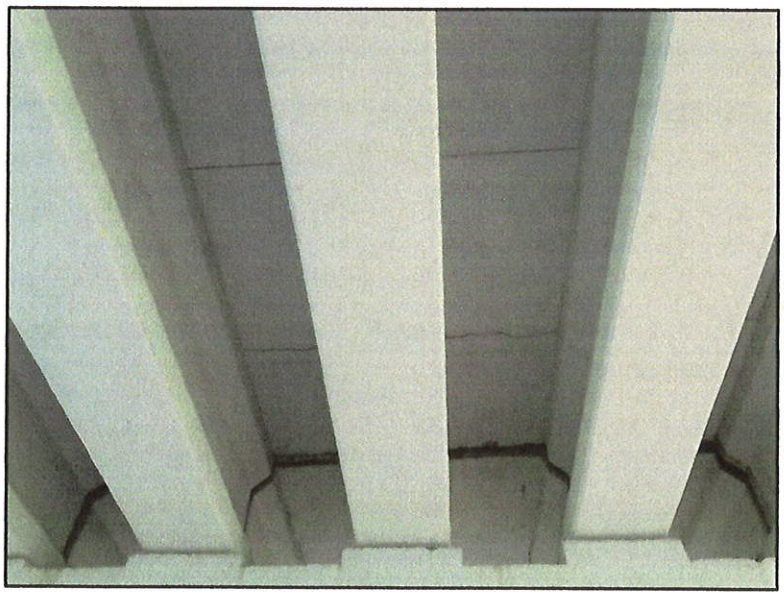
Figure 3.1.6-A (U.S.)

3.2 Superstructure

3.2.1 Concrete Slab and Diaphragms

There are minimal areas where visible cracks exist in the precast panels which support the deck. The cracks travel from one edge of the panel to the other edge. The cracked panels are located in span 1 in the second panel from the bent 2 expansion joint. Figure 3.2.1–A shows these cracked panels. Note that the U.S. spans utilize permanent metal deck forming and not precast panels. Therefore, it was not possible to observe the condition of the underside of the deck slab on the U.S. side of the bridge. Overall the slab and diaphragms appear to be in satisfactory to good condition.

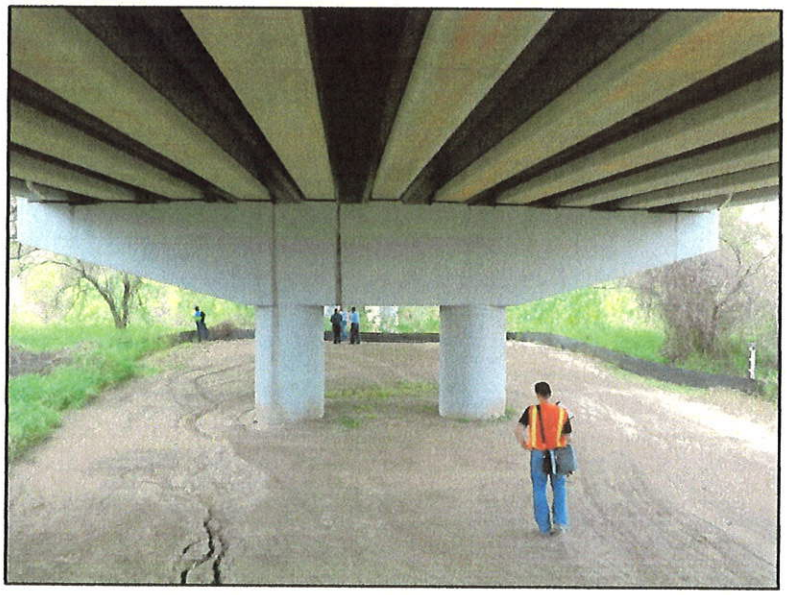
Figure 3.2.1-A (Mexico)



3.2.2 Beams

The bridge beams appear to be in good condition. Figure 3.2.2-A shows the beams in span 5. Only minor cracks and stains were observed.

Figure 3.2.2-A (U.S.)

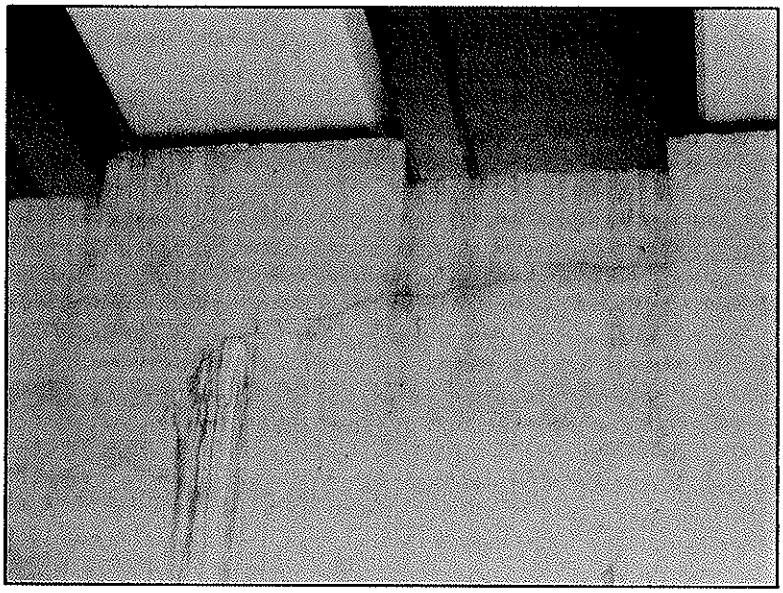


3.3 Substructure

3.3.1 Bearing Seats and Bearing Pads

Observation of the bearing seats and bearing pads was limited since no overhead equipment was provided. Observation of the abutment bearing seats and bearing pads was also limited due to confined space around the abutments. There appears to be concrete rubble on top of bent cap 3. Figure 3.3.1–A shows cracking that was found near the bearing seats on bent cap 2. The bearing pads in the abutments, that could be observed, appeared to be structurally adequate.

Figure 3.3.1-A (Mexico)



3.3.2 Bents Caps

The concrete bent caps appear to be in good condition with the exception of bent 2. Figure 3.3.2–A and 3.3.2–B show bent 2. This bent went through major rehabilitation approximately eight years ago to repair cracks that had appeared in the bent. The cracks were epoxy injected at the cap, columns and foundation. These cracks are either reappearing or new cracks have formed. The cracking appears on both sides of the cap. Also note the staining on the cap which is evidence that the expansion joint is not sealed properly. This type of staining occurs at all bent caps. Bent 2 should be closely monitored and may require maintenance in the near future.

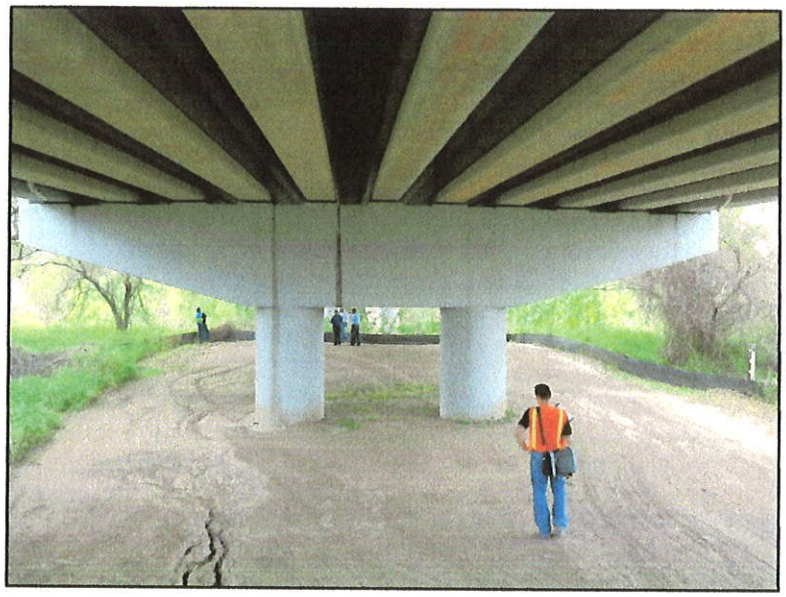
Figure 3.3.2–A (Mexico)

Figure 3.3.2–B (Mexico)

3.3.3 Columns

The concrete columns do not appear to have any deterioration that would indicate loss of structural capacity. Overall the columns appear to be in good condition. There is some minor staining on the columns as seen in Figure 3.3.3–A. This staining is caused by leakage in the expansion joints.

Figure 3.3.3–A (U.S.)



3.3.4 Abutments

The rip rap directly under abutment 6 has only minor cracking. However, away from the abutment the cracks are more pronounced, as seen in Figure 3.3.4–A. Graffiti covers some of the beams near abutment 6. Figure 3.3.4–B shows cracking at a joint where the ear wall and abutment cap meet. Other than staining on the abutment cap, there is no evidence of problems with the abutment cap, backwall, or wingwall. Overall the abutments appear to be in good condition.

Figure 3.3.4-A (U.S.)

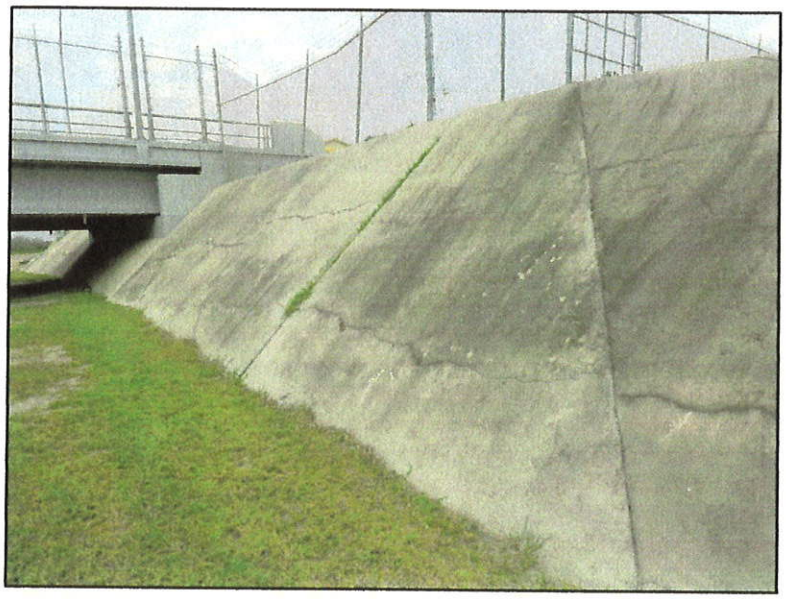
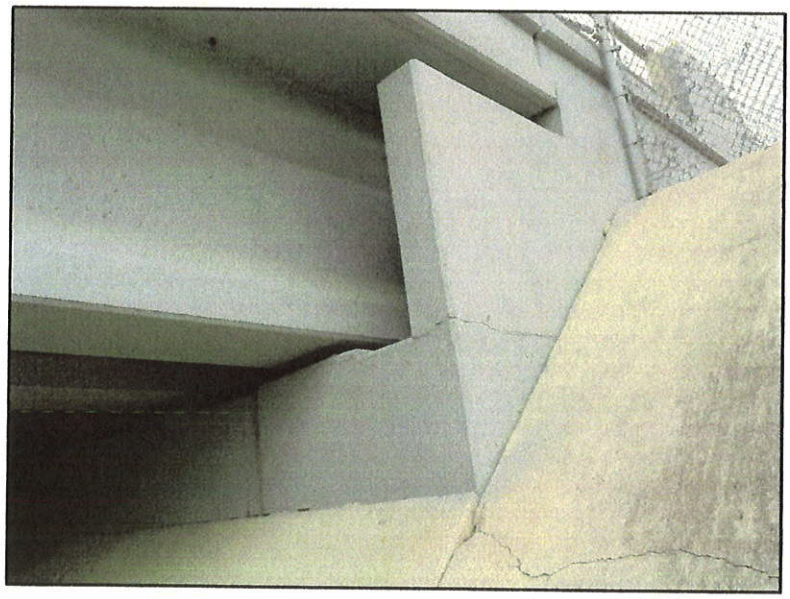


Figure 3.3.4–B (U.S.)



3.3.5 Foundations/Settlement

The two concrete columns at each bent are supported on a large concrete mat with multiple deep circular footings under the mat. The bearing seats at bent 2 are lower on the span 2 side and higher on the span 1 side as seen in Figure 3.3.5–A and Figure 3.3.5–B. This is an indication of possible settlement at bent 2. Other bents did not show signs of settlement.

No appreciable settlement was observed at the abutments from below the bridge. However, observation from the top of the bridge indicate some differential settlement has occurred at abutment 6, as evidenced by an approximately 1 ½" drop in sidewalk elevation from the approach slab to the bridge abutment, shown in Figure 3.1.4-F.

In addition, there was general erosion of the soil under span 2 and span 5, but not significant enough to affect the structural capacity of the foundations.

Figure 3.3.5-A (Mexico)

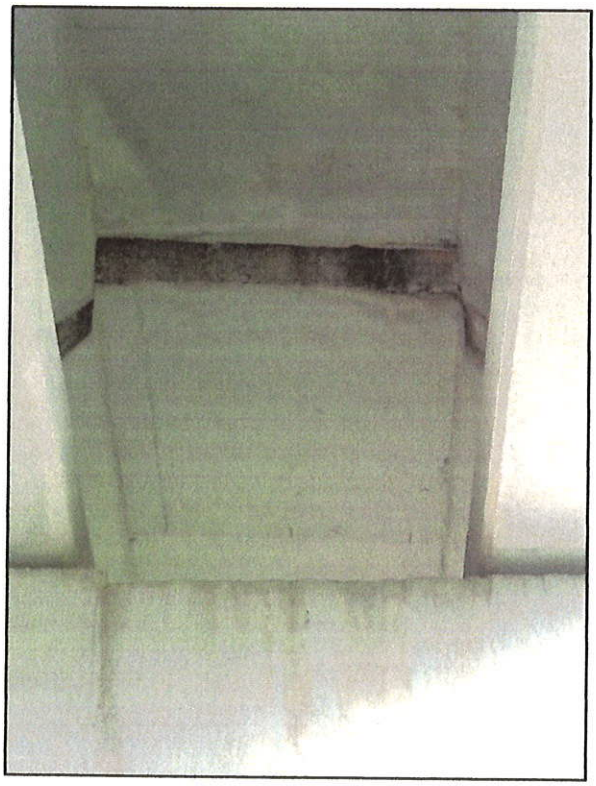
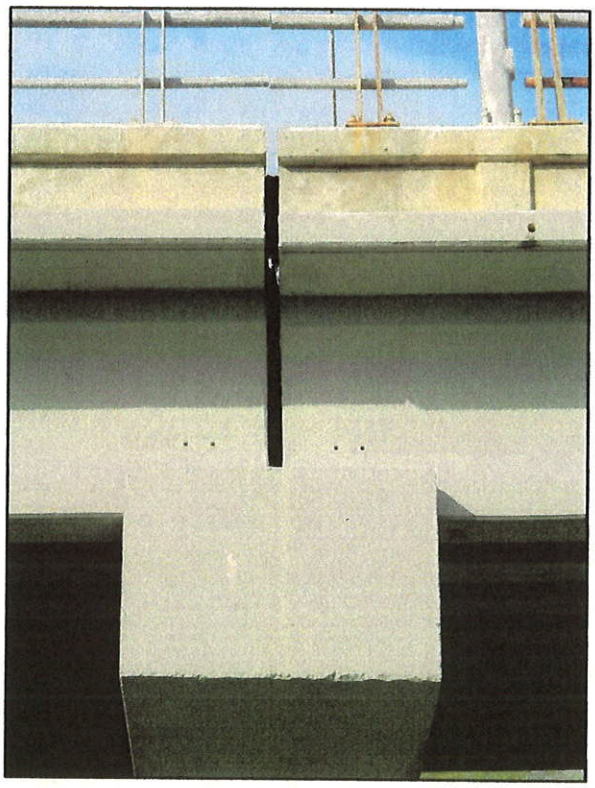


Figure 3.3.5-B (Mexico)



4 Summary and Conclusions

The overall condition rating for the bridge utilizes the following TxDOT rating scale:

TxDOT's Condition Rating Scale:
0 = Failed condition – bridge closed and beyond repair
1 = Failing condition – bridge closed but repairable
2 = Critical condition – bridge should be closed until repaired
3 = Serious condition – deterioration seriously affects structural capacity
4 = Poor condition – deterioration significantly affects structural capacity
5 = Fair condition – minor deterioration of structural elements (extensive)
6 = Satisfactory condition – minor deterioration of structural elements (limited)
7 = Good condition – some minor problems
8 = Very good condition – no problems noted
9 = Excellent condition
N = Not applicable

Condition Rating Table:

Bridge Component Description	Rating	
	U.S.	Mexico
Bridge Deck	7	7
Bridge Joints	6	5
Bridge Drains	6	5
Curbs and Sidewalks	7	7
Traffic Rails	7	6
Fence	7	N/A
Concrete Slab and Diaphragms	7	6
Beams	7	7
Bearing Seats and Bearing Pads	7	6
Bent Caps	7	5
Columns	7	7
Abutments	7	7
Foundations/Settlement	7	6
Overall Rating of Bridge	***7***	**6**

The ratings are based on the observations noted on the previous pages.

The overall condition rating for the U.S. side of the Free Trade International Bridge is "7", which is defined as "Good condition – some minor problems" per TxDOT's condition rating scale.

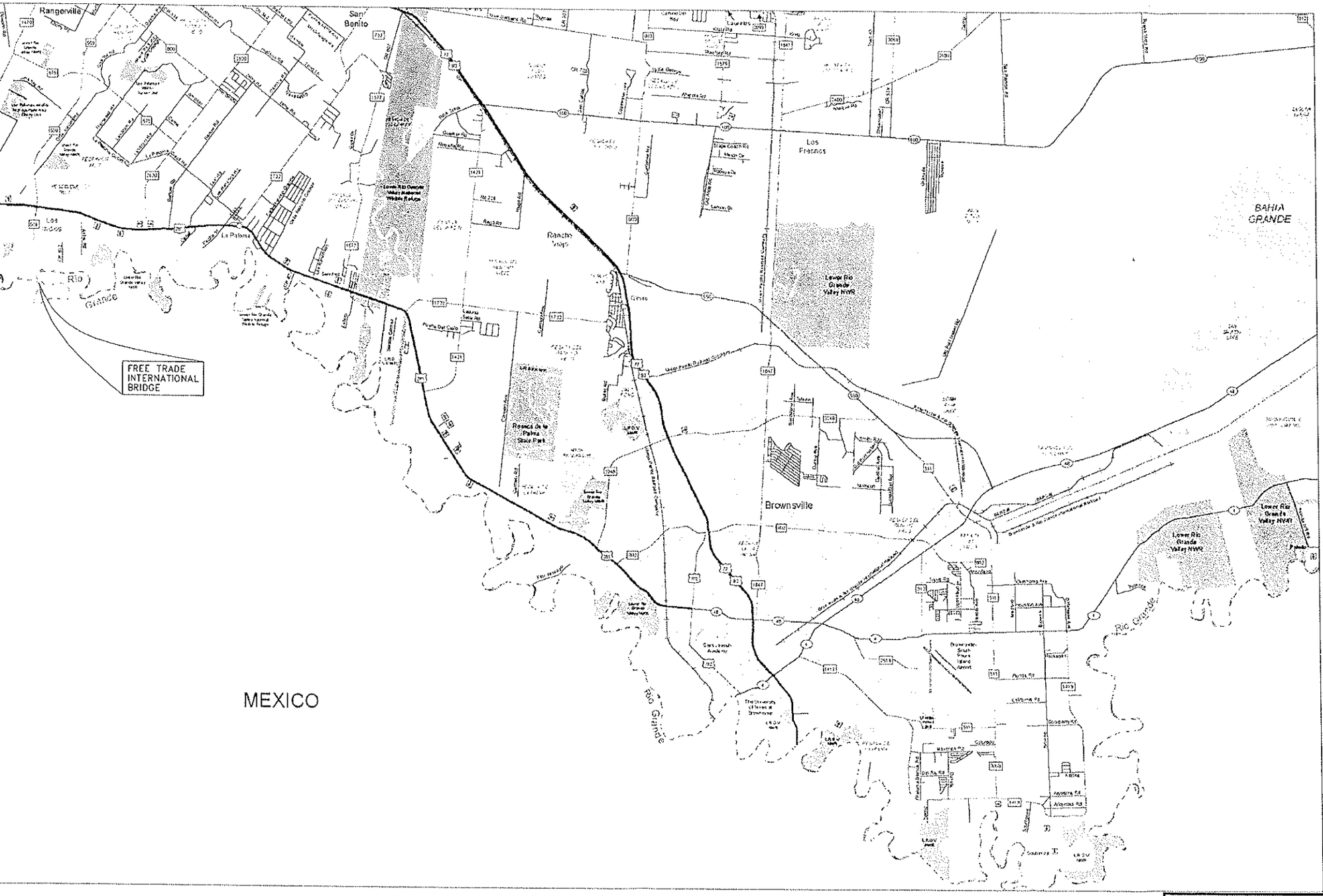
The overall condition rating for the Mexican side of the Free Trade International Bridge is "6", which is defined as "Satisfactory condition – minor deterioration of structural elements (limited)" per TxDOT's condition rating scale.

SUMMARY

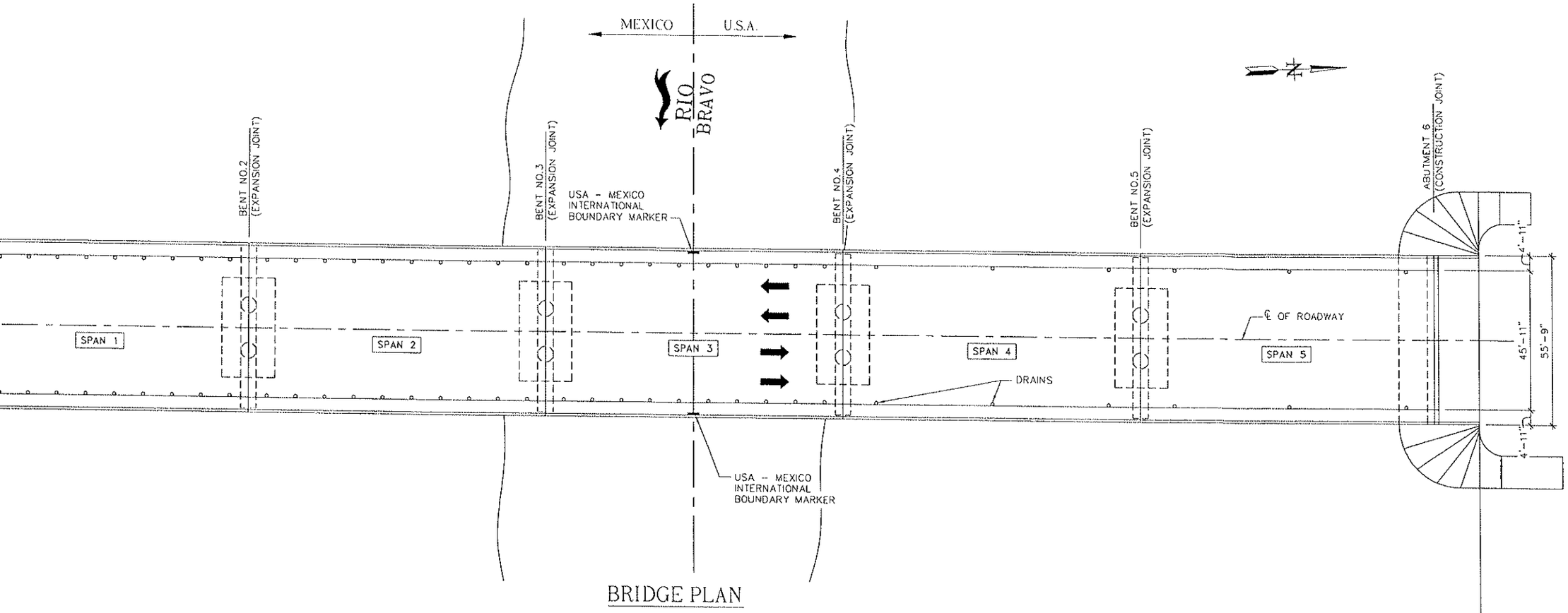
The Free Trade International Bridge is approximately 21 years old and with proper maintenance could remain functional for many years to come. The U. S. portion of the bridge consists of one abutment, two bents and 2 ½ spans. On the day of our visit, there was no pedestrian traffic and vehicular traffic was minimal.

Overall the U.S. portion of the bridge is in good condition with only minor concerns with the bridge joints and drains. The Mexican portion of the bridge received a satisfactory rating, with the most notable concerns being the extensively damaged expansion joint at the abutment, clogged bridge drains and excessive cracking at the bent 2 cap. Bent 2 underwent major repairs several years ago to repair cracks that had appeared. It appears that the cracks are reappearing or new cracks are forming. This bent should be closely monitored in the future.

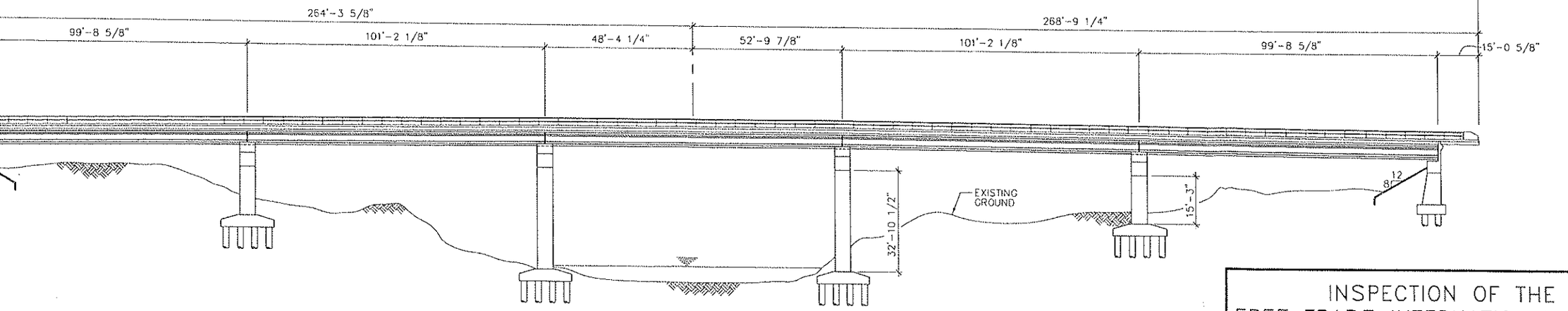
5 Bridge Plans



INSPECTION OF THE
FREE TRADE INTERNATIONAL BRIDGE



BRIDGE PLAN



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